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ABSTRACT

Part I of this paper reviews research on effects of vocational course work on dropout rates, probabilities of employment, earnings, productivity, and basic skills. The review is organized around 10 questions. Answers to these questions include: (1) vocational education lowers dropout rates; (2) economic benefits are substantial; (3) economic benefits depend on getting a training-related job; (4) less than half of vocational graduates get training-related jobs; (5) occupationally specific skills are not used because of lack of emphasis on placement, insufficient employer involvement, and training for jobs not in demand; (6) basic skills cannot substitute for occupational skills; (7) obsolescence is less important than not using and forgetting skills; (8) studying occupationally specific skills does not necessarily lower achievement in academic areas; (9) three or four courses in an occupational specialty are optimal; and (10) occupationally specific skills are best learned on the job. Part II presents recommendations for improving vocational education's contribution to successful labor market transition of disadvantaged youth. Recommendations include the following: (1) vocational teachers should take responsibility for and devote time to student placement; (2) well-informed career choice precedes entry into intensive occupational training; (3) basic skills should not be neglected; (4) training should be offered only in demand occupations; and (5) state aid should be allocated by a formula that rewards success in serving students. (YLB)

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Vocational Education For At-Risk Youth: How Can It Be Made More Effective?

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VOCATIONAL EDUCATION FOR AT-RISK YOUTH: HOW CAN IT BE MADE MORE EFFECTIVE ?

Minority youth and non-minority youth from economically disadvantaged backgrounds have great difficulty finding steady jobs that provide real training and advancement opportunities. In October 1986, only 32 percent of black youth who had recently dropped out of high school had a job and only 42 percent of the previous June's graduates not attending college had a job. For Hispanics, only 46 percent of recent drop outs had a job and only 65 percent of graduates not attending college had a job. While the employment rates among white youth were higher (47 percent for drop outs and 71 percent for non-college-bound graduates), it is clear the problem is not limited to minorities (BLS 1987). Would greater participation in vocational education on the part of these youth lower these extremely high unemployment rates and improve the quality of the jobs obtained? If so, what form should this education take? Should the goal of the occupational component of high school vocational education be occupationally specific skills, career awareness, basic skills or something else? What should be the relationship between programs providing occupationally specific training and the employers who hire their graduates?

The first part of the paper is a review of research on the effects of various types of vocational course work on dropout rates, probabilities of employment, earnings, productivity and basic skills. The review is organized around 10 questions. The questions and the corresponding findings are listed below:

Questions and Answers

1. Does vocational education lower dropout rates of at risk youth?
   (A) Yes. Taking one vocational course each year during the four years of high school raises the graduation rate of at-risk youth by 6 percentage points, and this raises expected earnings by about 2 percent.

2. How large are the economic benefits of high school vocational education for minority youth and for youth from disadvantaged backgrounds?
   (A) In the most recent studies the benefits are substantial. Hispanics appear to receive the greater benefits from vocational education than blacks or non-minority students.

3. Do the benefits of vocational education depend upon getting a training related job?
   (A) Yes. Economic benefits are zero if a training related job is not obtained. If a training related job is obtained, monthly earnings are

7-8% greater, unemployment is substantially reduced, labor force participation is more consistent, and productivity on the job is increased.

4. To what extent are the occupationally specific skills learned in high school being used?
   (A) Less than half get training related jobs (rigorously defined).

5. Why are the occupationally specific skills learned often not used on a job?
   (A) The cause is lack of emphasis on placement, insufficient involvement of employers, training for jobs not in demand.

6. Can basic skills substitute for occupational skills?
   (A) No, jobs require both.

7. Have high rates of skill obsolescence drastically lowered the payoff to occupationally specific training?
   (A) No. Obsolescence is less important than the risk of not using and forgetting skills.

8. Does studying occupationally specific skills in school necessarily lower achievement in the academic arena?
   (A) No, not if non-rigorous academic courses are sacrificed. Yes, if rigorous academic courses are sacrificed.

9. What is the optimal intensity of the occupationally specific component of a high school vocational education program?
   (A) Three or four courses in an occupational specialty are optimal.

10. Are occupationally specific skills best learned in a classroom or on-a-job?
    (A) Most skills are best learned on a job but employers cannot be counted on to provide training if schools do not. Consequently, schools should attempt to expand cooperative education but offer shop based training if cooperative placements cannot be found.

Youth from disadvantaged backgrounds who take vocational courses are more likely to graduate, are less likely to be unemployed and more likely to obtain better paying jobs . The earnings gains, however, depend on finding work that is related to one's training. If jobs are not related to training, high school graduates receive no economic benefits from their vocational education. Unfortunately, less than one-half of the graduates of high school vocational programs who did not go to college work in occupations that match (very broadly defined) their training.

Part II of the paper presents a series of recommendations for improving vocational education's contribution to successful labor market transition of

disadvantaged youth. Training related placement rates vary greatly from program to program and much of the variation can be explained by features of the vocational education program. A very important program feature is vocational teachers (not placement directors) taking responsibility for and devoting time to the placement of their students. It is also important that a well informed career choice precede entry into intensive occupational training, that basic skills not be neglected by the vocational student and that training be offered only in occupations with substantial employer demand and with substantial employer involvement in delivery of the training. Finally, it is recommended that state aid for vocational education be allocated by a formula that rewards success in serving students, instead of success in just recruiting them, and that offers greater rewards for success with more challenging students.

PART I. REVIEW OF RESEARCH

1. Does Vocational Education Lower the Dropout Rate?

One of the most important ways occupationally specific education can benefit students from disadvantaged backgrounds is by persuading them to stay in school long enough to graduate. A high school diploma raises earning power by nearly 40 percent, so vocational students who have been induced to stay in school benefit even if they earn no more than graduates who took no vocational courses.

Because students who are at higher risk of dropping out and dislike academic subjects tend to be attracted to the program, it is very difficult to determine whether vocational education lowers the dropout rate . This means that vocational education's effects on retention cannot be measured without thoroughly controlling for grades, academic ability, alienation from school and a host of other background characteristics.[1]

Using a longitudinal data set which contained controls for many of these variables, Mertens, Seitz and Cox, (1982) found that taking and passing a vocational course in 9th grade significantly lowered the dropout rate of dropout prone youngsters during 10th grade from about 9 percent to 6 percent. Taking one vocational course during each of the 3 preceding years lowered the 12th grade dropout rate from about 20 percent to 14 percent. The dropout rate during the 11th grade was not affected by taking vocational education in 10th

grade. These results imply that consistently taking and passing one vocational course each year from 9th through 11th grade raises the high school completion rate of dropout prone youngsters from about 64 to 70 percent. Applying the average effect of obtaining a diploma, this raises expected earnings by approximately 2 percent. The equations predict that two vocational courses per year for 4 years would have raised the completion rate of at-risk youth to about 76 percent and expected earnings by 4 percent. Other studies of the impact of vocational education on drop out rates have similarly concluded that it lowers the dropout rate (Lotto 1982; Weber, J. M. 1986).

2. How Large are the Economic Benefits of Vocational Education for Disadvantaged Youth?

Effects for All Youth

There have been quite a few studies of the impact of high school vocational education on labor market success of those who graduate from high school but choose not to go to college. Most of the early studies used student reports of their track to define participation in vocational education (Grasso and Shea 1981, Gustman and Steinmeier 1981, Woods and Haney 1981). When, however, these student reports of track were cross checked against transcripts, it was found that some of the self-identified vocational students had only a few vocational courses on their transcript and many "general track" students had taken 3 or 4 vocational courses (Campbell, Orth and Seitz 1981). Since it is the number and types of courses taken which are influenced by school policy, studies of the impact of vocational education need to employ objective measures of participation and not self-assessments of track, which apparently measure the student's state of mind as much as they measure the courses actually taken.

The solution to this problem is to use transcripts or school reports of courses taken to measure participation in vocational education. In his analysis of longitudinal data on approximately 3500 seniors from the Class of 1972, Meyer (1981) used school reports of the number of courses taken in vocational and nonvocational fields to define a continuous variable: the share of courses that were vocational. He found that females who devoted one-third of their high school course work to clerical training earned 16 percent more during the seven years following graduation than those who took no vocational courses (see Table 1). Those who specialized in home economics or other non-clerical vocational courses did not obtain higher earnings. Males who

Table 1

THE EFFECT OF OCCUPATIONAL TRAINING ON YEARLY EARNINGS

A Comparison of Studies

High School Vocational Education

Post 1983 Studies

	1981
Kang/Bishop (1986)	
Women: Business	$1674 (40%)
Trade & Tech.	$ 262 (6%)
Other	$ 882 (22%)
Men: Business	$-192 (-3%)
Trade & Tech.	$1472 (21%)
Other	$2488 (36%)
Campbell et al (1986)	
NLS-1983	$ 933 (17%)
HSB-1983	--- (27%)

Pre-1983 Studies

	Avg 73-79	1973
Meyer (1982)		
Women: Business	$ 410 (16%)	$ 426
Tech.	$ -72 (-2%)	$ -37
Home Ec.	$-248 (-5%)	$ 118
Men: Business	$ 106 (1%)	$ 86
Trade & Ind.	$ 201 (3%)	$ 493
Other Tech.	$ 94 (1%)	$ 491

	1979
Rumberger/Daymont (1982)	
Women	--- (8%)
Men	--- (10%)

CETA Classroom Training

Comparison Group Methodology

Bassi et al	
Young Women	$-302
Young Men	$-874
Dickinson et al	
Young Women	$ 117
Young Men	$-565

Supported Work Demonstration

Control Group Methodology

Fraker/Maynard	
Disadv. Youth	$ -18
Women on Welfare	$ 351

Job Corps

Comparison Group Methodology

Maller et al.	
First Year	$ 515
Second Year	$ 667
Third Year	$ 652
Fourth Year	$ 787

The Kang/Bishop estimates are based on the quadratic model and assume the individual goes from zero to 4 vocational courses and reduces academic courses from 12 to 8, with the reduction occurring in the following subjects: math, foreign language, science, and social science. The other category of vocational courses in Kang/Bishop includes home economics and exploratory vocational courses. Campbell et al. (1986, 1987) results are a weighted average for all three patterns of participation that combine those who found training related jobs with those who did not. Meyer (1982) and Rumberger/Daymont (1982) results are calculated by multiplying the coefficient on the proportion of courses that is vocational by .33. The CETA estimates are taken from Barnow's (1987, Table 3) review of the literature and are a simple average of results for white and minority youth. The Supported Work result is from Table 5 of Fraker/Maynard (1987). The Job Corps estimate includes both civilian and military jobs and uses non-linear time trends (Maller et al. 1982 p. ix). The estimated effects are reported in current dollars. The dates reported are the year of the earnings data. Since the studies analyze data from different years, comparisons between studies may be influenced by differences in the general level of wages.

specialized in trade and industry earned 2.8 percent more than those in the general curriculum. Males in commercial or technical programs did not earn significantly more than those who pursued a general curriculum.

Rumberger and Daymont (1982) used transcripts to define variables for the share of course work during the 10th, 11th and 12th grades that was vocational and the share that was neither academic nor vocational. Analyzing 1979/80 data on 1161 young adults in the National Longitudinal Survey (NLS) who were not attending college full time, they found that males who devoted one-third of their time to vocational studies instead of pursuing a predominantly academic curriculum spent about 12 percent more hours in employment, but experienced slightly greater unemployment and received a 3 percent lower wage. Females who similarly devoted one-third of their time to vocational studies at the expense of academic course work were paid the same wage but spent about 8 percent more time in employment and 1.6 percent less time unemployed.

Studies of vocational education that have used more recent data sets have obtained much more favorable results. Kang and Bishop's (1986) study of 2485 High School and Beyond (HSB) seniors who did not attend college full-time used student reports [transcripts were not available] of courses taken in three different vocational areas--business and sales, trade and technical, and other--and five academic subjects--English, math, science, social science and foreign languages--as measures of curriculum. Males who took 4 courses (about 22 percent of their time during the final three years of high school) in trade and technical or other vocational subjects by cutting back on academic courses were paid a 7 to 8 percent higher wage, worked 10 to 12 percent more, and earned 21 to 35 percent more during 1981, the first calendar year following graduation. Males who took commercial courses did not have higher earnings or wage rates. Females who substituted 4 courses in office or distributive education for 4 academic courses were paid an 8 percent higher wage, worked 18 percent more, and earned 40 percent more during 1981. Females who took trade and technical courses did not receive higher wage rates and earned only slightly more than those who pursued an academic curriculum. The benefits probably diminish in later years, but this is of little consequence since the incremental costs of four vocational courses can be recovered in just one or two years at this rate.

Recent studies by Paul Campbell and his colleagues at the National Center for Research on Vocational Education also obtained very positive findings.

Controlling for test scores and past and present enrollment in higher education, their analysis of 1983 and 1985 National Longitudinal Survey data on 6953 young men and women between the ages of 19 and 28 found that graduates of vocational programs had 16.5 percent higher earnings than those who had specialized in academic courses [comparison is made with academic rather than general track students because most general track students take one or two vocational courses]. A parallel study of 6098 members of the class of 1982 cohort of High School and Beyond which controlled for test scores and college attendance found that the vocational graduates were 14.9 percent more likely to be in the labor force in 1983/84, were one percentage point less likely to be unemployed, and were paid about 9 percent more per month than the academic graduates. The overall earnings effect was 27 percent.[z] The differential between vocational and general curriculum graduates [who generally took 1 to 2 vocational courses] was generally about half the size of the differential between vocational and academic graduates.

These very positive results contrast markedly with the very negative findings regarding CETA's classroom occupational skills training programs for youth and the Supported Work Demonstration (see the right hand side of Table 1). Only the Job Corps, a considerably more costly training program, has positive impacts that even approach these results. There are four reasons for viewing the more recent studies as more accurate descriptions of the current impacts of vocational education than the studies published prior to 1983. First, vocational education has been changing rapidly. During the 1970s, competency based instruction tied to competency profiles certifying the skills learned became common practice, career education courses preceding the selection of an occupational specialty were introduced, job search skills were added to the curriculum of most vocational programs, home economics was reoriented from a focus on home making to a focus on preparation for work, and the content of many individual programs was upgraded and updated. Consequently, the data on the younger members of the NLS Youth sample and on High School and Beyond students, who received their vocational instruction between 1978 and 1982, is much more relevant to vocational education as it is now practiced than the Class of 1972 data analyzed by Meyer, Gustman/Steinmeier and Woods/Haney. Second, the labor market reward for the skills taught might be experiencing secular change. If it were, it would be important to analyze

the most recent data possible. Third, large samples are preferable to small samples. In the four year interval between the Rumberger/Daymont analysis of NLS youth data and Campbell et al's analysis, the number of graduates for which high school transcript data was available nearly doubled. This makes the findings in Campbell et al's 1986 and 1987 papers a more reliable estimate of vocational education's effect than those provided by Rumberger/Daymont's 1982 study and the early studies of NLS data done by Mertens and Gardner (1982) and others. Fourth, the more recent studies have much improved measures of participation in vocational education. Studies which use transcript information to define the variables characterizing vocational participation (ie. the work of Meyer, Rumberger/Daymont, and Campbell and his colleagues) are clearly preferable to studies using student reports of track and probably preferable to those using student reports of courses taken (ie. the two Kang/Bishop studies).

Effects on Minority Youth

Studies that have examined whether the payoff to vocational education differs for students from minority backgrounds have found that Hispanics tend to receive higher benefits from pursuing a vocational program than non-Hispanic whites. The returns for blacks vary across studies but seem to be roughly comparable on average to those received by whites. Meyer (1982) found that devoting one-third of ones courses to a commercial curriculum was associated with 20 percent higher yearly earnings among Hispanic women, 16 percent higher yearly earnings among black women and 14 percent higher yearly earnings in the full sample containing whites as well. Hispanic males benefited more than whites but black males benefited less. Sample sizes were quite small in Rumberger and Daymont's (1982) study, so differences in the payoff to vocational education for students from different ethnic or economic backgrounds were not reliably estimated. Nevertheless, the pattern was similar to that found by Meyer-- Hispanics benefited more than whites and blacks benefited less. Rumberger/Daymont also looked at how the return to vocational education varied with parent's education and found that the students whose parents had less than 12 years of schooling benefited the most from vocational course work.

Table 2

VOCATIONAL EDUCATION'S IMPACT ON MONTHLY EARNINGS
In Current or Most Recent Job
of
19-26 Yr. Olds in National Longitudinal Survey
(in percent)

	Hispanics	Blacks	All Youth
Relative to Academic			
Concentrator	16.3	4.5	5.9
Limited Concentrator	12.5	3.1	.6
Concentrator Explorer	9.4	1.7	1.8
Relative to General			
Concentrator	3.2	3.9	5.1
Limited Concentrator	-.7	2.6	.2
Concentrator Explorer	-3.8	1.2	1.0
Number of Observations			
Academic	134	256	1264
Concentrator	70	98	557
Limited Concentrator	114	182	867
Concentrator Explorer	72	95	481
Total	828	1252	6054

The first three rows of the table compare the monthly earnings in the current or most recent job of graduates who pursued vocational curriculum with varying degrees of intensity to graduates who took no vocational courses and concentrated on academic courses instead. Concentrators averaged 6 occupational vocational courses, limited concentrators averaged 3.3 such courses and concentrator/explorers averaged 2.6. The academic alternative is an average of self reported academic curriculum and transcript defined academic curriculum. The next three rows compare gaduates who pursued vocational curriculums to graduates who took a mixture of courses generally including one or two vocational courses. (Campbell et al, 1986).

Table 3

VOCATIONAL EDUCATION'S IMPACT ON MONTHLY EARNINGS
In Current or Most Recent Job
of
20 Yr. Old High School and Beyond Sophomores
(In Percent)

	Hispanics	Blacks	All Youth
Relative to Academic			
Concentrator	.2	6.5	10.3
Limited Concentrator	-2.4	-2.3	5.4
Concentrator Explorer	-6.4	2.5	7.1
Relative to General			
Concentrator	7.3	6.4	7.1
Limited Concentrator	4.6	-2.4	2.2
Concentrator Explorer	.6	2.4	3.9
Number of Observations			
Academic	70	67	749
Concentrator	121	98	836
Limited Concentrator	178	151	1166
Concentrator Explorer	108	99	726
Total	958	802	6384

The first three rows of the table compare the monthly earnings in the current or most recent job of graduates who pursued vocational curriculum with varying degrees of intensity to graduates who took no vocational courses and concentrated on academic courses instead. Concentrators averaged 6 occupational vocational courses, limited concentrators averaged 3.3 such courses and concentrator/explorers averaged 2.6. The academic alternative is an average of self reported academic curriculum and transcript defined academic curriculum. The next three rows compare gaduates who pursued vocational curriculums to graduates who took a mixture of courses generally including one or two vocational courses. (Campbell et al, 1986).

The final study to address this issue is Campbell et al. (1986). Unfortunately, this paper examined only one outcome--monthly earnings in the current or most recent job--which is generally less responsive to curriculum than employment and unemployment. The results are summarized in Tables 2 and 3. The first three rows of each table compare the monthly earnings in the current or most recent job of graduates who pursued vocational curriculum to graduates who took no vocational courses and concentrated on academic courses instead. When the contrast is made with those pursuing an academic curriculum using NLS data, the return to vocational education is much greater for Hispanics than for non-Hispanic whites and the returns for blacks are roughly equal to those for whites. In HSB data the payoff to vocational education is substantially lower for Hispanics and slightly lower for blacks. The next three rows compare the vocational students to general track students whose transcripts generally contain one or two vocational courses. When comparisons are made to general track students, ethnicity appears to have no effect on the magnitude of the payoff to vocational education.

3. Do the Benefits of Vocational Education Depend on Getting a Training Related Job ?

Effects on Earnings

Two of the studies discussed in section 2 (Campbell, et al. 1986; Rumberger and Daymont 1982) have examined whether the economic benefits of vocational education depend on finding a training related job. Both studies found that getting a training related job was essential for the training to payoff. Table 4 summarizes Campbell, et al.'s analysis of data on males and females combined from the High School and Beyond and the National Longitudinal Survey. Vocational graduates who obtain a job in an occupation matching their field of training spend about 20 percent more time in the labor force than general track graduates.[3] Their rates of unemployment are about 3 percentage points lower. Vocational graduates working outside their field of training are not significantly more likely to be in the labor force or to be employed than general track graduates.

The third and fourth columns of the table present estimates of the effect of vocational education on current monthly earnings controlling for current and past enrollment in college. High school graduates who took a vocational

Table 4

THE ECONOMIC EFFECT OF VOCATIONAL EDUCATION

(Relative to Graduates Who Pursued a General Curriculum)

OUTCOMES

Groups In Comparison to General Curriculum	Labor Force Participation (age 20)	Unemployment (age 20)	Monthly Earnings (age 20)	Monthly Earnings (age 19-26)
Vocational Grads				1985
Training Related	20%***	-3*	7%**	8%**
Not Training Related	2%	1	3%*	-5%
Academic Grads	-9%***	1	-5%*	0%

Source: Table 14 and 16 of Campbell, Basinger, Dauner, and Parks, Outcomes of Vocational Education for Minorities, the Handicapped and the Poor. The classification of students into vocational, academic and general was based on the high school transcript. A graduate was in a training related job when the occupation matched (liberally defined) the field for which he/she trained. Results reported are averages of coefficients on concentrator, limited concentrator and concentrator explorer. For the labor force participation model the value presented in the table are the estimated coefficients divided by the mean labor force participation rate. Coefficients from regressions predicting the log of monthly earnings have been multiplied by 100 to approximate percentage impacts. The regressions included controls for the following: sex, minority status, handicapped, limited English proficient, test scores, grade point average, family background, attitudes, past and present college attendance, employment during high school, aspirations in 8th grade, region, rural/urban. The fourth column reports analyses of NLS data. Taken from Table 7 of Campbell et al., 1988b. The first 3 columns are based on HSB data and contain additional controls for presence of a spouse or child, absenteeism and discipline problems in high school. The monthly earnings models control for labor market experience and tenure on ones current job. The HBS model of monthly earnings also contained controls for occupation. The average significance level of the coefficients are indicated by the number of stars. *** is significant at the .01 level using a two tail test. ** is significant at the .05 level. * is significant at the .10 level.

concentration obtain significantly higher monthly earnings (7 to 8 percent higher) only when their current job is related to their training. When their current job is not related to their training, they do not receive higher wage rates than students who have pursued a general program of study in high school. Students who pursued an academic curriculum in high school did not do better than those pursuing a general curriculum; in one data set they were earning 5% less.

If students stay in the occupation for which they train for many years, the benefits of the occupational training appear to grow even larger. An analysis of data from the NLS reported in Campbell et al (1987) found that graduates of vocational programs who spent 100% of their work time since high school in a training related job earned 31 percent more in 1984 than the vocational graduates who had never had a training related job.

Effects on Productivity and Training Costs

Studies of the effect of vocational education on the productivity of new hires have found that vocationally trained workers are somewhat more productive and less costly to train than other workers doing the same job but only when the job is related to their training. The evidence for this statement comes from statistical comparisons of pairs of workers doing the same job.[4] The data are presented in table 5, which has been summarized from Bishop (1982, 1985). Compared to those without vocational training, new hires with relevant training in high school required 9 percent less training, and were 3 percent more productive both initially and after a year or so on the job. Not surprisingly, those with relevant training from postsecondary institutions did even better. If, however, the training is not relevant to the job, graduates of secondary and postsecondary vocational programs were initially less productive, required 6 percent more training during the first 3 months on the job, and were only slightly (1.4 percent) more productive after a year at the firm.

These findings imply that the private and social benefits of vocational education derive from the occupationally specific skills that are developed. Some of the skills taught in vocational classes are transferable--useful in a great variety of occupations--but skills taught in nonvocational classes are transferable as well. Vocational classes are not better at instilling valuable transferable skills than nonvocational classes. In other words,

TABLE 5

IMPACT OF VOCATIONAL EDUCATION
ON TRAINING COSTS AND PRODUCTIVITY

(Percentage Difference From Workers
Without Vocational Training)

	Relevant High School Training	Relevant Public Post Secondary Training	Non-Relevant Training
OUTCOMES			
OJT Time	-9	-22**	6.3
Productivity			
in first 2 weeks	3	13**	-3.0
in next 10 weeks	2	4	- .5
At Present or when the employee separated	3	1	1.4

** significant at the 5% level (two sided)

Source: Column 1 & 2 estimates for those with relevant training is from Table 3.13 of Bishop et al., 1985. Estimate for those with non-relevant training is from Table 5 of Bishop The Social Payoff from Occupationally Specific Training, 1982.

vocational education as now practiced does not do a better job of preparing youth for generic jobs than more academic forms of education. There may be ways of delivering vocational education that do a better job of teaching character or generic skills than an academic education, but these programs are not common enough to affect statistics on the aggregate impact of vocational education.

4. To What Extent are the Occupationally Specific Skills Learned in High School Being Used?

During their four years in high school, 1982 graduates took an average 2.3 Carnegie units of exploratory vocational courses (industrial arts, home economics, typing I, etc.), 2.1 units of occupational vocational courses and 17.2 units of other courses. The 27 percent of these graduates who described themselves as specializing in a vocational field obtained 2.8 Carnegie units in exploratory vocational courses, 3.7 units in occupational vocational and 14.9 units in other areas (Pliski, 1984; table 3.3). This implies that the 73 percent of students who report they are not specializing in a vocational field account for 67 percent of the students in exploratory courses and 52 percent of the students in occupational courses.

How frequently do students use and therefore benefit from their occupationally specific training? Twenty-eight percent of the graduates who have taken 2 or more occupational vocational courses in a specific area (the concentrators, limited concentrators and concentrator explorers of the typology developed in Campbell, Orth, and Seitz, 1981) enter a four-year college or university after high school (unpublished tabulation of 1983 NLS youth provided by Paul Campbell). There is no data on how many of these graduates major in subjects which make use of knowledge and skills obtained in vocational courses.

What about the students who seek jobs immediately after graduating from high school? The empirical work reported in the previous section classified a youth as having a training related job when the occupation of the individual's current or most recent job matched his/her field of training. By this definition, 43 percent of the employed graduates who had been out of school between one and ten years currently had a training related job (broadly defined) in the 1985 National Longitudinal Survey of Youth (Campbell et al., 1987). Other studies of high school vocational education using the same

methodology obtain similar results.[5] Felstehausen's (1973) study of 1981 vocational graduates in Illinois found training related placement rates of 27 percent in business occupations, 17 percent in trade and industry, 52 percent in health, and 20 percent in agriculture. Conroy and Diamond's study (1976) of Massachusetts graduates obtained a training related placement rate of 29 percent for business and 37 percent for trades and industry. High school vocational education is not the only occupational skills training program with low training related placement rates. The proportion of CETA participants whose occupational field 12 months after completion of training matched their field of training was only 41 percent for clerical training, 39 percent for training in operative occupations and 29 to 32 percent for professional and craft training (Barnow 1985) In contrast, 6 months after passing a German apprenticeship examination, 68 percent of those with civilian jobs were employed in the occupation for which they were trained (much more narrowly defined) (Federal Institute for Vocational Training, 1986).[6]

5. Why Are The Occupationally Specific Skills Learned So Seldom Used On A Job?

In 1980, the National Center for Research in Vocational Education undertook a massive study of the determinants of training related placement rates (McKinney et al., 1982; Lewis et al., 1982). Controlling for the local unemployment rate and the congruence of school and community racial composition, Lewis et al. (1982) found that training related placement rates were higher when vocational teachers accepted responsibility for placement, when they spent considerable time on placement, when admission to the program was restricted, and when career exploration was an important part of the program.

Other research suggests that another important cause of the problem is the limited employer involvement in the training. Mangum and Ball (1986) have found in their analyses of NLS data that employer controlled training institutions have much higher training related placement rates. Using a procedure of matching training fields against jobs, they found that the proportion of male graduates who had at least one job in a related field was 85 percent for company training, 71 percent for apprenticeship, 52 percent for vocational-technical institutes, 22 percent for proprietary business colleges, and 47 percent for military trainees who completed their tour of duty. The

rates for females were 82 percent for company training, 59 percent for nursing schools, 61 percent for vocational-technical institutes, 55 percent for proprietary business colleges, and 49 percent for military training.

The graduates who do not find training related jobs often complained that no such jobs were available. Aggregating the data from 3 different follow-up studies, Mertens et al. (1980) report that 25 percent said no job was available in an area related to training, 11 percent said their high school training was insufficient, and 10 percent said they couldn't earn enough money in a related field. These statistics suggest that occupational training needs to be sensitive to the market both in the selection of and design of training programs.

Poor career guidance is apparently contributing to the problem for the 21 percent that said they left the field because they didn't like the work, the 2 percent said they didn't know what the job was really like and the 5 percent said they switched fields when they got training in the military or at a postsecondary institution.

Some of the students apparently take occupational courses without having real plans to pursue a related occupation. Counselors and vocational teachers report that some of the students taking vocational courses are there to avoid more difficult academic subjects or to get permission to take a job during part of the school day. Others apparently change their career goals. Still others use the courses as a vehicle for career exploration (something for which they are often not really designed).

Another reason why many high school graduates are unsuccessful in finding good jobs is that schools quite often ignore their requests for even the most minimal assistance in their job search -- for example, sending transcripts to prospective employers. To get a good job, one must stand out in the crowd of applicants. Since more than 10 people apply for the typical job, being average is not good enough. A recent high school graduate cannot hope to compete for the better jobs if schools deny employers access to reliable information on a student's performance in high school. If employers know nothing about a student's high school accomplishments, work experience will inevitably become the primary hiring criterion and recent graduates will be at a disadvantage. When high school grade point average is entered on a job application, it has a greater impact on employer ratings of the attractiveness of particular job

applicants than any other single factor including information on high school graduation and the extent and nature of previous work experience (Hollenbeck and Smith, 1984).

Although the Buckley Amendment requires school officials to share transcripts with employers when a student or graduate signs a release, many schools fail to respond to the signed releases sent by employers. For example, Nationwide Insurance, one of the most respected employers in Columbus, Ohio, sent 1200 requests for transcript information to local high schools in 1982 and received only 93 responses. Only 20 of these responses provided all the information requested. When school officials were asked why they were not responding to the requests, the answer was that they were too busy.[7] Postsecondary institutions were reported to be much more cooperative in providing transcript information. Students headed for college are clearly receiving preferential treatment, for schools seldom fail to respond to a student's request that a transcript be sent to a college. The students who look for work after high school are not informed of their school's unwillingness to aid their job search by providing transcript information and probably do not realize that their inability to get quality jobs is due in part to this policy. Because high school transcripts are so difficult to obtain and are also slow to arrive, most employers have given up requesting them.

6. Can Basic Skills Substitute for Occupational Skills?

If choices have to be made, what priority should be given to basic skills and what priority should be given to occupational skills? Basic skills--the ability to read, write, speak, compute and reason--are essential to almost everything a person does. Occupational skills are useful primarily at work and only when there is a correspondence between one's occupational skills and one's job. This suggests that occupationally specific training should occur after a career has been at least tentatively selected. Can one postpone career choice until graduation? Would it be feasible to concentrate solely on basic skills expecting that they would substitute for occupational skills when a career is later selected?

A review of research by industrial psychologists on the relationship between productivity in particular jobs and various predictors of that productivity is helpful in thinking about this issue. This research has found

that direct measures of both basic skills (general mental ability tests) and occupational skills (job knowledge tests) have very large associations with reported productivity (Hunter and Hunter 1984; Reilly and Chao 1983). When job knowledge (occupational skills) tests appropriate for the job compete with GMA (basic skills) tests in predicting job performance measured either by supervisory ratings or actual work samples, the job knowledge tests have the greatest impact (Hunter, 1983). Hunter, Schmidt and Judiesch (1988) have found that the standard deviation of output is 16 percent of the mean in clerical and operative occupations. When GMA is held constant, a one standard deviation improvement in job knowledge raises productivity by about 8 percent. When job knowledge is held constant, a one standard deviation improvement in GMA raises productivity by about 4 percent. Large improvements in job knowledge are easier to achieve than equivalent (in proportions of a standard deviation) improvements in basic skills. Thus, while basic skills are important, there would seem also to be an important role for occupationally specific training. The research suggests that basic skills and GMA have high associations with productivity primarily because they help the worker learn the job and occupation specific skills that are used to do the job. Consequently, one is forced to conclude that basic skills are not a substitute for skills that are specific to a job or an occupation.

7. Have High Rates of Skill Obsolescence Drastically Lowered the Return to Occupationally Specific Training?

It is sometimes argued that high school students should concentrate on basic skills rather than occupational skills because jobs are changing so rapidly that occupational skills learned in school soon become obsolescent. This argument is sometimes preceded by the assertion: "In the future, technological advances will come at an increasingly fast pace" (Levin and Rumberger, 1983, p. 21). In fact, however, the available evidence on changing skill requirements suggests that change is less rapid now than in the past. Rates of job turnover, rates of exit from agriculture, and overall technological progress are all lower now than in the first seven decades of the twentieth century. Separation rates in manufacturing were 5 percent per month during the 1920's and 4.4 percent during the 1970's. To be sure, the 1982 recession and the overvalued dollar have increased the number of workers being forced to change jobs and occupations. However, the changes being experienced

by the current generation of working adults pale by comparison to the changes experienced by the generation that lived through the depression, the mobilization for WWII and the rapid demobilization after the war. Workers have always had to learn new occupational skills.

The skill obsolescence argument against locating occupationally specific training in high schools has a number of flaws. First, obsolescence is a pervasive phenomenon. The ability to do square roots and long division by hand or on a slide rule has lost much of its value as the use of calculators has grown. Protons, electrons and neutrons are no longer considered the fundamental particles of nature. Rates of obsolescence are higher in fast changing fields that are close to the frontier of knowledge. The labor market responds to high rates of skill obsolescence by paying a higher premium for the skill. The high starting salaries of engineers in part derives from the high rate of obsolescence of their skills. Consequently, there is no reason to expect a negative correlation between rates of skill obsolescence and the rate of return to an investment in a skill.

Occupational knowledge is cumulative and hierarchical in much the same way that mathematics and science is cumulative and hierarchical. Having good basic skills lowers the costs of developing occupational skills but it does not lower these costs to zero. Everyone must start at the bottom of the ladder of occupational knowledge and work their way up. New technology does require that workers learn new skills, but the new skills are generally learned as small modifications of old skills. While learning a new skill is easier when the worker has good basic skills, a foundation of job knowledge and occupational skills is more essential. At some point every individual must start building his/her foundation of occupational skills. When the foundation building should begin is primarily a function of when the individual is able to decide which occupation to pursue.

Skills and knowledge deteriorate from non-use much more rapidly than they become obsolescent. In one set of studies, students tested 2 years after taking a course had forgotten 1/2 of the college psychology and zoology, 1/3 of the high school chemistry, and 3/4 of the college botany that had been learned (Pressey and Robinson, 1944). Kohn and Schooler (1978) argue that even the very basic cognitive abilities tend to deteriorate if the worker's job does not call for their use. On the other hand, skills and knowledge that are used are

not forgotten. In general, forgetting is a more serious threat to knowledge and skills than obsolescence. Consequently, when deciding what to study, the probability of using a skill or knowledge base is more important than the rate of obsolescence of that knowledge.

Occupational skills become obsolescent more rapidly than basic skills, and this means that vocational teachers must give high priority to keeping their curriculum and their own skills up-to-date. However, differences in rates of obsolescence should not decisive considerations in choosing between an academic and a vocational curriculum. Much more important is whether the knowledge and skills gained will be remembered and used. Basic skills are important to and used in almost all occupations and in most adult roles--parent, citizen and consumer --and, therefore, seldom deteriorate rapidly after leaving school. Basic skills, however, should not be confused with the content of specific academic courses. Much of this content is seldom used and quickly forgotten by those not going to college.

Since occupational skills are useful in a limited cluster of occupations, occupationally specific training needs to be conditioned on a reasonable prospect of soon working in the occupation. The reason for this conclusion is first, that the educational investment pays off only if the skills are used (see section 1); second, that skills deteriorate with lack of use; and third, that motivation to learn is weak if there is little prospect of using what is learned. Intensive occupationally specific training should begin after a student has made a reasonably well informed tentative career choice and be for occupations with good job prospects.

8. Does Studying Occupationally Specific Skills in School Necessarily Lower Achievement in the Academic Arena?

Since the total number of courses that one can complete during high school is limited, taking vocational courses restricts the number of academic courses one can take, and vice versa. Does this mean that developing occupationally specific skills in high school implies diminished basic and academic skills? Longitudinal data are essential to address this question because it is well known that students who have done poorly in academic courses in 9th and 10th grade are more likely to choose vocational courses in the 11th and 12th grade.

Haney and Woods (1982) investigated this issue in longitudinal data on students who graduated from high school in the early 1960s and found "no support for the proposition that the basic skills learning of secondary vocational program students is any less than that of general program students."

There have been major changes in schools and vocational education since the 1960s. Are these conclusions still valid? To address this question, a study was conducted of the cohort of High School and Beyond students projected to graduate in 1982. The dependent variables were the change between sophomore and senior years in test scores, grades, career plans, key attitudinal variables such as self-esteem and locus of control, and an index of student deportment (Bishop, 1985). The model included extensive controls for variables that may influence both curriculum and the outcomes. These include an array of socioeconomic background variables, base year grades, test scores, attitudinal variables, base-year educational and occupational expectations, and parents' career expectations for their children. Numerous measures of curriculum were used to assess curriculum effects, including base-year, self-reported curriculum track (vocational and academic), self-reported number of courses taken between the sophomore and senior year in a variety of subjects, and self-reported data on whether the respondent had taken algebra II, trigonometry, calculus, physics, chemistry, biology, an honors English course, and an honors math course."

The results of these analyses show that curriculum does, in fact, have a strong influence on many of these outcomes, but traditional measurement of curriculum by reference to track placement does not capture these effects. The traditional track variable (self-reported membership in the academic or vocational track as employed by Haney & Woods) has little or no impact on any of the outcomes (not shown). When, however, specific course descriptions are used (e.g. algebra II, physics), the effects of taking a college preparatory curriculum of calculus, trigonometry, algebra II, physics, and chemistry are striking (see table 6).

Holding the total number of academic courses and their distribution across fields constant, taking the 5 college preparatory math and science courses listed above raised math and science performance by 75 percent of a grade equivalent, verbal test scores by 33 percent of a grade equivalent, and

Table 6

Change in Academic Achievement
Resulting from Modifying Curriculum

(in Percent of a Grade Level Equivalent)

Achievement on	Taking Rigorous College Prep Courses	Taking 3 Additional Courses in Math & Science	Taking 3 Additional Courses in Business & Office	Taking 3 Additional Courses in Technical
Verbal Test	34%***	-1%***	20%***	4%
Math Test	76%***	19%***	-9%	15%**
Science Test	74%***	- 9%***	- 6%	-1%
Civics Test	44%*	-18%***	+15%**	1%
GRADE POINT AVERAGE	-.12**	0.0	.06**	.05*

Source: Entries are averages of coefficients from seperate regressions for males and females. For the four test scores, entries are coefficients scaled as a percent of a grade level equivalent under the conservative assumption that the test's standard deviation is equal to 3 grade level equivalents. The results for GPA are in percents of one point on a 4 point GPA scale. The dependent variable was the change between the end of sophomore and senior years. The models used to derive these estimates contained a total of 75 control variables. Included among the control variables were the sophomore values on the 10 other outcome measures, a great variety of specific courses, years of courses in specific subjects taken during freshman and sophomore year and during junior and senior year, family background, self-assessed ability to succeed in college, and parental pressure to attend college.

*Statistically significant at the 95 percent level.
**Statistically significant at the 99 percent level.
***Statistically significant at the 99.9 percent level.

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civics test scores by 44 percent of a grade equivalent.[9] Self-esteem, deportment and occupational and educational aspirations were also raised substantially. If a student takes 3 additional year-long math and science courses but avoids the more rigorous courses listed above and does not change the number of courses taken in other fields, math test scores increase by 19 percent of a grade equivalent, but verbal and civics test scores decline by an almost equal amount. Self-esteem and career aspirations did not change. Deportment and educational plans improved modestly.

The results also indicate that vocational courses sometimes contribute more to the development of basic skills than watered down courses in academic subjects. Holding constant the academic course load and the dummies for the 5 courses indicating a college prep curriculum, taking 3 full-year business and office courses raised civics and verbal test scores by 15 to 20 percent of a grade equivalent. It also improved deportment, self-esteem and educational plans. Taking 3 full-year courses in the technical area raised math performance by 15 percent of a grade equivalent. Trade and industry courses and the residual category of vocational course had small negative effects on test score gains.

Why does taking a rigorous college preparatory curriculum in math and science have such salutary effects on a whole range of tests? The crucial difference is apparently that these college preparatory classes are more demanding than other classes. This is clearly the case in our data, for the students that took all 5 of the college preparatory classes got significantly lower grades than those who took other courses in these fields. Apparently the key determinant of learning is the rigor of the courses taken, not the total number of academic courses or the total number of hours spent in a school building during a year.

9. What is the Optimal Intensity of the Occupationally Specific Component of a High School Vocational Program?

Complete specialization in vocational education which ignores preparation in basic skills is not as effective as a curriculum that provides both vocational skills and competency in basic skills. In their 1988 paper studying earnings in the year after graduation, Kang and Bishop found that there are decreasing returns from specialization, and that academic and vocational education are complements rather than substitutes. In other words,

students who choose to take some modest level of vocational course work benefit greatly relative to those who specialize totally in academic courses, but the benefits of additional vocational courses sharply diminish once 3 or 4 are taken. For example, when the total number of academic and vocational subjects is 12, substituting a four course trade or technical program for an equivalent number of academic courses raises a young man's earnings by $1536 or 22 percent, but adding another two trade and industry courses to the program lowers earnings by $316. The implication of this result is that (a) every student who does not have definite plans to attend college full time should be urged to take 3 or 4 courses in an occupational specialty and (b) that vocational students should be counseled against taking an excessive number of vocational courses.[19]

10. Are Occupationally Specific Skills Best Learned in a Classroom or On-a-Job?

A case can be made that the occupationally specific skills that many high school vocational programs are teaching in a lab or shop setting are best learned on a job. Work habits are also best learned on a job. Evidence of the great value of on-the-job learning comes from the success of the German apprenticeship system, from Hollenbeck and Wilkie's (1985) analysis of CPS data on employer provided training, and from longitudinal studies of American youth.

Students who worked while in high school were generally much more successful in the labor market than those who did not. Figure 1 summarizes unpublished findings regarding the impact of working while in high school taken from Kang and Bishop's (1984) study of the effects of curriculum on labor market success. Holding a job during the summer between junior and senior year had large effects on wages, employment, and earnings. For boys, 30 hours of work per week during the summer between junior and senior years led to 8 percent higher wage rates, 12.5 percent more employment, and 11 percent higher earnings in the period immediately following high school. An equivalent total number of hours worked during the senior year (i.e., averaging 10 hours a week) raised the wage rate of boys by 1.5 percent, employment by 3 percent, and earnings by 8 percent. Holding a job during junior year in high school had practically no effect on labor market success

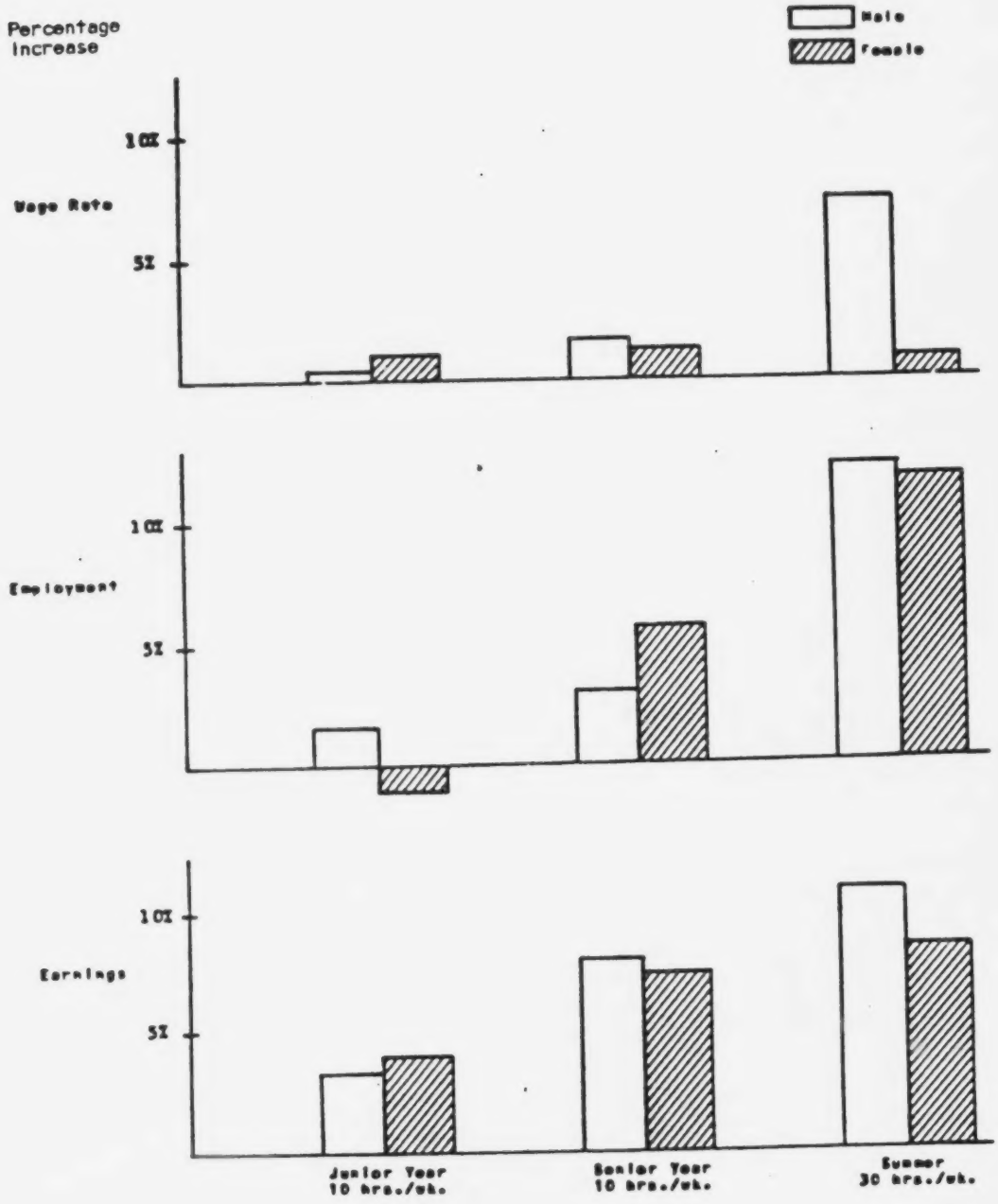

Figure 1. Effects of work during high school on labor market success in the two-year period after graduation.

after school. Girls who worked during summers and senior year also experienced substantial gains in employment and earnings.

The magnitude of these effects diminish over time but, nevertheless, remain substantial (Kang, 1984). Compared to those without work experience, those who worked 10 hours per week through the last two years in high school earned 8 to 20 percent more in the first three months after graduation and 5 percent more during the sixteenth through twenty-first month after graduation.

Are these labor market benefits bought at the expense of any undesirable effects of having a job while in school? Greenberger and Steinmier (1981) have noted that high school students who have part-time jobs during the school year are less committed to school and family and are more likely to engage in anti-social behaviors such as theft and substance abuse. They incorrectly interpret this association as evidence that part-time work causes these outcomes. In fact, causation runs primarily in the opposite direction. Studies of the determinants of work while in high school have found that working during the junior and senior years is often a consequence of the student's earlier rejection of the academic goals of the school and alienation from the institution (Hotchkiss 1982, 1984).

Consequently when studying the effects of working during the school year on later academic outcomes, it is essential to use a longitudinal design and to control thoroughly for aspirations, attitudes, grades and academic achievement measured before going to work. Hotchkiss's (1982) analysis of a longitudinal survey of Columbus high school students found that hours worked had no effect on days absent, days tardy, or grade point average. Bishop's (1985) study of changes in test scores, GPA, deportment, and educational plans between sophomore and senior year of the High School and Beyond survey found small negative effects of work experience during the junior year but no deleterious effect of working as a senior.[11]

When employers provide training, it is apparently very effective. Hollenbeck and Wilkie (1985) found that training to qualify for one's current job was associated with a larger earnings gain when it was provided by a previous employer than when it was obtained at a high school. This occurred even though training provided by employers is almost always of shorter duration than high school training. Bishop (1985) found that the productivity of new employees rises by more than one-third in the first three months and by

more than 25 percent in the succeeding two years, and that much of this productivity gain is due to the training received.

Why is employer provided training so effective? Five reasons appear to account for it. First, because employers are paying for both the trainer and the trainee's time and receive most of the benefits, they have a strong incentive to select cost effective training strategies. Second, trainees are well-motivated because skills developed are almost certain to be used, and because promotions and pay increases go to those who do well. Third, the training is generally tutorial in nature and this is known to be an effective teaching method. Fourth, since training is generally done by supervisors, trainers are aware of the trainee's progress and corrective instruction can be given when necessary. Fifth, the trainer (not just the trainee) is held accountable for success since the training is designed to increase productivity and supervisor/trainers are held accountable for the productivity of the work group.

The problem with employer training is that there is too little of it. When the skills being developed are useful at many firms, employers are unwilling to pay for it because of the possibility the trainee will leave. Workers are forced to pay for it by accepting a low wage during the training period, but cannot afford to invest in more than a very limited amount of general training (Bishop 1985; Hubbard and Judd 1986). If high schools stopped offering clerical training, students who could not afford to attend a secretarial college would effectively be denied access to clerical occupations and a shortage of typists would soon result.

PART II POLICY IMPLICATIONS

A major implication of the research reviewed in part I of this paper is that the primary outcome of occupationally specific education is occupational knowledge and skills, and that the benefits of this knowledge and skills derive from their use. It is legitimate for vocational educators to focus on imparting occupational skills and knowledge, but they should not disclaim responsibility for whether the skills are used. The character of the programs influence whether students get a job or training opportunity that makes use of the skills and knowledge taught. Implicitly or explicitly, the students have been promised that they will benefit if they try hard. The research implies that the benefits of occupationally specific education are primarily economic

and that they derive from using the skills and knowledge gained (see sections 1, 2, 3, 4, 6 and 7). Consequently, programs need to be structured to maximize the probability that students get to use what they have learned either in a job or in further training. The research also indicates that the payoff to 3 or 4 occupational courses is very high, but that additional courses have no payoff. Vocational students need to devote a major portion of their time to the development of basic skills.

The research discussed in sections 5, 7, 8, 9 and 10 suggests how these objectives can be accomplished: a well-informed career choice needs to precede entry into intensive occupational training, cooperative education needs to be expanded, employers need to become more involved in planning and delivering vocational education, teachers and administrators need to give greater priority to the placement function, and programs need to be up-to-date and for occupations with strong employer demand. The author's recommendations for changes in vocational education are discussed under the following headings:

1. Counseling Before Entry into Occupationally Specific Programs
2. Expanding Cooperative Education
3. Developing A Strong Basic Skills Foundation
4. Honoring Academic Achievement
4. Helping Students Obtain Good Jobs
5. Restructuring State Funding Formulas to Promote Effective Service to the Disadvantaged

Strict new mandates regarding procedures for delivering vocational education are not desirable, however, for they are nearly impossible to enforce and are potentially counter-productive because there is no single best method of serving students. What is needed most is the systematic collection of data on student outcomes, and a funding system that prevents creaming while rewarding programs and teachers for achieving better student outcomes.

1. Counseling Before Entry into Occupationally Specific Programs

A great deal of counseling and thought should precede the student's choice of an occupationally specific program. Where possible and appropriate, career exploration courses should be available to 9th and 10th graders considering entry into occupationally specific training. Courses need to be specially designed with this purpose in mind. Skill instruction and hands-on

experience with the tools and materials of a craft are valuable, but this needs to be supplemented by visits to work sites and the opportunity to interview and shadow workers in a variety of jobs in the field. High school labs and workshops do not by themselves provide a good preview of what a particular line of work is like.

An individualized employability plan should be developed jointly by school staff and students considering entry into occupational (as distinct from exploratory) vocational courses. For students considering an occupational specialty this process should include the following steps:

- disclosure of the past record of each vocational program in placing graduates in training related jobs or further education, and the wages and other characteristics of the jobs obtained.

- student participation in a systematic career selection program.

- student investigation of the occupation through taking a part-time job or interviewing and shadowing people who work in the field. The student should be expected to write an essay about this experience and explain why he/she wants to prepare for this occupation.

- conferences with a guidance counselor on the issue of career choice and curriculum that include both the student and his parents.

- development of an employability plan for/with the student which would result in a "contract" being signed between students, parents, vocational teacher, and employer representatives. The student would state an intent to seek employment or further training in the field after graduating and teachers and employer representatives would assure the student of a training related job when the program is completed.

Programs with high placement rates and heavy demand should be expanded, but where excess demand exists there is nothing wrong with the common practice of giving preference to students who exhibit a particularly strong commitment to the occupation.[12] Motivation and grades in courses that prepare one for the field might also be considered. Even where everyone who applied is admitted, it is desireable to project an image of selectivity because it prevents vocational students from being stigmatized and instills pride in the chosen field and a commitment to excel.

Screening students for interest might initially reduce the number of students in occupationally specific educational programs. However, if it succeeds in raising the esprit of the students in occupational programs and the payoff to their training, the high standards can be expected to attract additional students into the field just as they have been attracted to the magnet high schools of New York, Chicago and many other cities.

2. Expanding Cooperative Education

About one-tenth of the nation's high school vocational students now participate in cooperative education (Lewis and Fraser, 1982). The research discussed in Section 10 suggests that it needs to be expanded. Most vocational students should have coop jobs during summers and the final year of occupational training.[13] One of the barriers to greater numbers of students participating in cooperative education is the difficulty of earning the required number of academic credits while holding down a job during school hours. Ways need to be found to lower this barrier. One approach would be to schedule cooperative jobs outside of school hours. Certainly some way of compensating teachers for supervision outside of normal hours can be found. Jobs that must be scheduled during school hours could be accommodated by holding special coop classes outside of normal school hours.

There will be no difficulty finding coop placements for clerical and distributive education students. Placing health, trades and technical students may be difficult, however. In order to help place these students and insure that the jobs really offer training, coop staff should facilitate applications for waivers which allow coop students to be paid 75 percent of the minimum wage. The training costs in these jobs are significant, and the lower wage during the training period is justified. In Germany, for example, first-year apprentices are generally paid only one-fourth of what they will make when the apprenticeship is completed. Paying below the minimum wage in the training slots is also desirable because it insures that the students are in the program because of the opportunities to learn a skill rather than just to earn money and get out of school.

In many of the best coop programs, teachers and employer advisory committees devise a list of competency objectives for each field and agree on how to divide the responsibility for teaching these skills. The coop contract

would specify the competencies the employer is to teach. The student would receive a competency profile checklist at the beginning of the program, and the competencies developed would be recorded on this document as they are learned. The competency profile would also serve as a credential that assists in the placement of students in jobs and further training.

3. Developing A Strong Basic Skills Foundation

Everyone needs to be able to reason, solve problems, and communicate both verbally and in writing (see section 6). Elementary/secondary education needs to place the highest priority on developing these abilities. The responsibility for achieving these objectives probably should not rest with English and math teachers alone; history, art and vocational teachers should reinforce (i.e., demand) basic skills as well. In reality, however, vocational courses are often organized in a way that does not require students to employ basic skills. Students in vocational classrooms spend only 3 to 7 percent of their time applying basic skills to learning vocational skills (Halasz and Behm 1983, Halasz, Behm, and Fisch 1984).[20] When these findings have been presented to vocational teachers, their reaction has often been "it is not my responsibility." (Halasz, personal communication). Time on task findings and teachers reactions would probably be similar in art, health, science and many other courses. These attitudes should be changed. The newly developed principles of technology courses are a positive development but not sufficient on their own. Vocational students should be expected to learn some of their occupational skills from printed material. Verbal explanations and visual demonstrations by the teacher should not be the only mode of instruction. Vocational students need to get practice explaining job tasks to others and writing out instructions because career advancement will be depend on their ability to teach as well as their skills and learning ability.

The total number of academic courses taken does not matter nearly as much as the standards and content of courses that are taken (see section 8). Legislated increases in the number of academic courses required for graduation will increase achievement only if the standards and content of the courses taken are upgraded. Merely taking more academic courses does not increase academic achievement. In order to develop the skills that will be essential for later advancement, vocational students should be encouraged to take the

more demanding math and science courses that they often avoid. In some technical fields, courses in chemistry, physics, algebra and trigonometry might be a required part of the curriculum.

4. Honoring Academic Achievement

Many students from disadvantaged backgrounds find academic learning difficult. By 9th grade, many of them are so far behind that they have given up the hope of ever being perceived as academically successful. Once a student comes to this conclusion, his/her reaction is often to denigrate the students who take academic learning seriously and to honor other forms of achievement--athletics, dating, holding their liquor and being "cool"--which offer them better chances of success. Occupationally specific education offers these students a new forum in which to try their talents--a forum in which success is possible and effort is rewarded. The recognition that students receive from participating in local and regional 4H, VICA and DECA contests helps them develop pride in their developing occupational skills and are an important motivator.

Interscholastic athletics has a similar awards and recognition system. The medals, trophies, and school letters that are awarded are powerful motivators of achievement on the playing field. Academic pursuits desperately need a similar system of reinforcement. Public school systems in Tulsa and a number of other cities have started awarding school letters for academic achievements. Awards and honors systems should be designed so that almost every student can receive at least one award or honor before graduation if he or she makes the effort. Outstanding academic performance (e.g., high grades or high test scores) would not have to be the only way of defining excellence. Awards could be given for significant improvements in academic performance since the previous year or since the beginning of the school year, for public service in or out of school, for leadership and participation in extracurricular activities, for participation in student government, for perfect attendance records, and for student of the week (criteria would vary weekly). The standard for making an award should be criterion referenced: if greater numbers achieve the standard of excellence, more awards should be given.

Periodically, the parents of the most recent award winners and sponsoring teachers should be invited to an evening assembly at which time the principal

would award the students the certificate or plaque recognizing their accomplishments. A prominent place in the school should be reserved for bulletin boards where pictures of the most recent winners and reasons for their receiving recognition could be posted. Another form of recognition could be displays of student work: art, science, social studies, vocational education projects, and so forth. While the primary purpose of this system would be to improve the school's educational climate, a secondary effect would be the creation of a tool to help the student obtain a good job. The potential of these awards as an aid to improving employability should be made clear to students and parents. If the high school does not have such a system and cannot be induced to create one, the vocational program (or area voc-tech school) should recognize accomplishments in language arts, mathematics and science by their students at their periodic awards ceremonies.

Competency Profiles

Another way to motivate students is to give them feedback on their accomplishments through the mechanism of a criterion referenced competency profile. Competency profiles are a check list of competencies needed in a specific occupation which the student either has or can develop through study and practice (see exhibit 1). The ratings of competence that appear on a competency profile are relative to an absolute standard, not relative to other students in the class. Grading on a curve is destructive of student motivation for it puts close friends into zero-sum competition with each other. If one student studies harder, he/she is lowering the grades of the other members of the class. Not surprisingly the peer group sanctions those who study hard by calling them "brain geeks", "grade grubbers" or "brown nosers." By evaluating students against an absolute standard, the competency profile avoids this negative feedback of one student's effort into another student's grade. It encourages students to share their knowledge and teach each other.

A second advantage of the competency profile approach to evaluation is that students can see their progress as new skills are learned and checked off. The skills not yet checked off are the learning goals for the future. Seeing such a check list get filled up is inherently reinforcing. With a competency profile system, goals can be tailored to the student's interests

Exhibit I

Area Vocational Center
Ithaca, New York 14850
(607) 257-1551

EMPLOYABILITY PROFILE

1986-87

NAME _____ COMPONENT SCHOOL _____

COURSE AUTO MECHANICS II DATE _____

1. ABOVE ENTRY LEVEL 2. ENTRY LEVEL 3. NEEDS IMPROVEMENT 4. UNACCEPTABLE

SAFETY

_____ Operate fire extinguisher
_____ Operate shop equipment safely including floor jacks, safety jacks, grinder, oxy-acetylene torch and hoists
_____ Clean shop and keep house properly

GENERAL SKILLS

_____ Locate and interpret technical data
_____ Demonstrate written communication skills
_____ Demonstrate verbal communication skills
_____ Performs required shop maintenance
_____ Demonstrate shop safety and practices

BRAKES

_____ Adjust brakes
_____ Install brakes, both drum and disc
_____ Overhaul wheel cylinders, drum type and disc
_____ Bleed system, pressure bleeder and using foot brake
_____ Adjust emergency brake
_____ Install emergency brake
_____ Install, clean and repack front wheel bearings, install seals and adjust
_____ Troubleshoot brakes
_____ Troubleshoot problems

AMMCO BRAKE LATHE

_____ Observe safety rules
_____ Set up and turn drums
_____ Set up and turn rotors
_____ Measures drums and rotors

STEERING & SUSPENSION SYSTEMS

_____ Inspect front end parts
_____ Replace front end parts
_____ Replace rear suspension parts
_____ Repack front wheel bearings & install grease seals
_____ Adjust front wheel bearings

FRONT END ALIGNMENT

_____ Interpret whell alignment and geometry
_____ Locate and interpret wheel alignment specifications
_____ Set up and operate alignment equipment
Adjust caster, camber on:
_____ Eccentric type front end
_____ Shim type front end
_____ Moveable "A" frame type front end
_____ Rear wheels
_____ Adjust toe in, toe out

OXY-ACETYLENE TORCH

_____ Observe safety standards and use proper attire
_____ Adjust regulators for proper flame for heating & welding
_____ Be able to cut, braze and weld

NEW YORK STATE INSPECTION

_____ Make out inspection records
_____ Follow inspection procedures
_____ Interpret rules and regulations
_____ Test P C V System
_____ Check out emissions with analyzer

AUTO AIR CONDITIONING

_____ Understands theory of operation
_____ Understands system operation
_____ Understands system controls and automatic systems
_____ Partial recharging
_____ Servicing of system
_____ Diagnosis of system

COMPUTERIZED CONTROLS

_____ System check of computer command
_____ System check of Ford ECC IV

IGNITION SYSTEM & TUNE-UP

_____ Explain and identify breaker point ignition system
_____ Operate timing light and set timing – check advance
_____ System check of Chrysler Electronic Ignition System (EIS)
_____ System check of Chrysler hall effect Electronic Ignition
_____ System check of AMC Breakerless Inductive Discharge Ignition System (BID)
_____ System check of 6.M C-3
_____ System check of Ford Dura Spark and EEC System
_____ Remove and replace rotor, distributor cap, rotor, and secondary harness
_____ Understand electronic ignition service, testing & replacement of components
_____ Remove and install spark plugs using proper torque specfications

SET UP, CALIBRATE, OPERATE 1215 ENGINE ANALYZER

_____ Recognize and interpret secondary wave form patterns
_____ Recognize and interpret vacuum gauge readings
_____ Recognize and interpret tachometer readings
_____ Operate advance unit timing light
_____ Interpret dwell readings
_____ Test coil output

CLEANING, WASHING & WAXING

_____ Wash car, car windows, use chamois, clean interior of car (ash tray, door jams, etc.)
_____ Know how to wax a car by hand
_____ Used car reconditioning

VOLT AMP TESTER

_____ Set up VAT 40
_____ Perform battery load test
_____ Perform charge system test
_____ Perform starter load test

OTHER

_____ Makes flat rate estimates
_____ Serves as shop foreman
_____ Organizes parts cabinets and supplies

TIRES

_____ Mount & Dismount
_____ Balance - Sun Computer
_____ Balance - Bubble
_____ Repair Tires
_____ Rotate Tires

Comments: _____

_____

_____

WHITE COPY-STUDENT SERVICES

Instructor _____

and capabilities, and progress toward these goals can monitored and rewarded. Students who have difficulty in their required academic subjects could nevertheless take pride in the developing occupational competence now recognized just as prominently as course grades in academic subjects. Upon graduation, the competency profile would be encased in plastic, given to the student, and serve as a credential certifying occupational competencies.

5. Helping Students Obtain Good Jobs

Schools can help their graduates avoid unemployment and get better jobs by improving the quality and facilitating the flow of employment-related information to students and their potential employers. Improving the information available to all parties in the job search/hiring system will have the following consequences:

- A greater share of school leavers will find employment.
- The jobs they obtain will pay better and offer more training and job security.
- The better jobs will be distributed more in accordance with the objective merit of the candidate.
- Students will commit a greater amount of time and effort to their studies as they perceive the greater payoffs for doing so.

Facilitating information flows also will contribute to achieving the educational goals that are the school's primary responsibility. A number of policies that have been advocated for educational reasons would also improve the credentials new high school graduates bring to the labor market:

- Helping students acquire needed basic and vocational skills along with good work habits
- Honoring academic achievement with a system of awards and schoolwide recognition for academic and nonacademic accomplishments similar to the system that recognizes athletic achievement
- Certifying competencies with certificates and diplomas that recognize competencies achieved rather than just time served
- Implementing a grading system that recognizes effort and improvement as well as accumulated knowledge
- Offering courses in job search skills to help students successfully navigate in the world of work

- Inviting employers to serve as advisors to students

Policies whose primary objective is to ease the school-to-work transition or to facilitate information flows can also motivate students to apply themselves to their studies. Many students who would otherwise not be motivated to study, for example, can be motivated to apply themselves if they are shown the connection between today's schoolwork and tomorrow's jobs. Policies that facilitate information flow make the connection between effort in school and later labor market success more visible. Such policies include the following:

- Acting as a source of informal contact
- Rewarding teachers for placing their students
- Developing long-term relationships between school staff and local employers who hire their school's graduates
- Formulating an effective and equitable policy for releasing information about students to potential employers
- Developing a job search portfolio transcript in cooperation with local employers that reports student accomplishments in a standardized format, and encouraging students to use it when seeking a job

Offering Courses in Job Search Skills

Schools have an important role to play in preparing youth to navigate in the labor market. Career guidance and career counseling have been viewed as important school functions for many decades. Realizing that a career choice cannot be implemented unless a job can be obtained in the chosen field, many schools are teaching youths how to search for work (Wegmann 1979). They need to get practice in writing a resume, in interviewing, and in employing the more effective informal modes of job search.

Acting as a Source of Informal Contacts

Many schools provide job placement and referral services for their students and graduates. Three-and-a-half million people found their current job through a referral by their school, college or a teacher (Rosenfeld 1975). This function of schools is a lot more important than is generally thought. Since, however, fewer than 10 percent of recent high school graduates report having found their job through a school placement service, their is a great

deal of room for expansion of this service. Such an expansion should receive high priority.

School personnel can be a reference and a source of job contacts for their students. Some students may feel that they do not have and cannot develop good employment contacts. School personnel can help out by building and maintaining trusting relationships with local employers and then helping to match employer and student needs. Students from disadvantaged backgrounds have special need for this kind of help, because their relatives and neighbors typically lack the work world contacts of middle-class families.

Whenever possible, there should be a one-on-one relationship between a specific teacher or administrator and an employer. A study by McKinney et al. (1982) found that when schools formalize this relationship by creating a placement office, the number of jobs found for students tends to decrease. The best example of an informal contact system is the one that exists for many vocational students. Vocational teachers often know local employers in related fields; they also know their students well enough to recommend them. This kind of informal system could be extended to include all students not planning to attend college.

Rewarding Teachers for Placing Their Students

Leaving the responsibility for placement with the vocational teacher forces more involvement with local employers and helps to foster a mentorship relationship between teacher and student. Teachers should assist their students, current graduates and past graduates to find training related jobs, and their success in this area should be evaluated and rewarded.

Rewarding teachers for placing their graduates in a job or further schooling that is training related is appropriate because the necessary outreach work takes time and deserves compensation, and because an incentive to devote time to the task is necessary. Employer satisfaction with graduates, the wage levels of the jobs, and the quality of teaching should also be evaluated and rewarded.

Guiding students in assessing jobs and employers.

Students need help in assessing jobs, and schools can provide them with the information necessary to make these assessments. Career guidance tends to focus on the individual's choice of occupation. Attention also needs to be

given to selecting an employer and matching employer/employee needs. Young people who find good, high-wage jobs with promotion opportunities will end up changing jobs less often. Students need to learn how to assess such dimensions of a firm as training opportunities, promotion opportunities, job security provisions, maternity leave rules, vacation policies, policies regarding tardiness, friendliness of co-workers, effectiveness of supervision, medical insurance, educational leave, and tuition reimbursement.

Inviting Employers Into the School

Another way schools can help students develop informal contacts is to invite employers into the school. A retired employer, for example, can make an excellent volunteer advisor. This individual can come to the school and get to know a group of students. Students benefit from hearing firsthand stories about the business world and hearing what employers expect from employees. Students would also benefit by knowing someone in the field who may be able to serve as a contact. The retired employer can help students by referring them to other employers.

Releasing Student Records

The school can help students provide employers with information by developing an equitable and efficient policy for releasing student records. While developing this policy, school officials should keep in mind the dual goals of protecting the student's right to privacy and trying to help the student find a good, suitable job. The student and his/her parents should receive certified copies of the transcript and other records that might be released.

Schools can develop a form that would explain to parents and students their rights, as well as the pros and cons of disclosing information. The Buckley Amendment requires that the form specify the purpose of disclosure, which records are to be released, and who is to receive the records. The law allows the student to specify a "class of parties." The class specified could be "all potential employers contacted by the student," which would cut down on the paper work needed. Once the student has filed a request, the school is required by law to comply. Schools can best serve students by handling all inquiries expeditiously and without charge.

Developing a Job Search Portfolio

Schools should provide students with a job search portfolio or competency profile that records all their accomplishments in one place. Students attempting to market themselves to employers will have greater success if all their school achievements are summarized in one compact, standardized document. Compactness and standardization make it easier for employers to use information in their hiring decisions, and this facilitates information flow.

The coverage and format of the document are probably best worked out cooperatively by a committee that includes school administrators, employers and other interested parties. Developing and using such a document might be a part of a campaign to enlist commitments from major local employers to hire the school's graduates. Developing the information system cooperatively is a good way to ensure that the finished form will be beneficial to schools, employers, and students.

Students have many talents and skills that can be highlighted in such a document. The job search portfolio should emphasize accomplishments and performance indicators that are most useful in identifying a good match between a job and a youth. This would include grades in specific courses, achievement test scores, and a check list of competencies developed in vocational courses. An example of such a portfolio is given in exhibit 1. Student and parents should receive copies of it, and students should be encouraged to bring copies with them when they apply for jobs. Employers should be encouraged to ask to see the portfolio and keep a copy when a job application is filed.

6. Restructuring State Funding Formulas to Promote Effective Service to the Disadvantaged

State governments pay a major share of the costs of vocational education and thus have a responsibility to see that this money is well spent. The effort to ensure quality by regulating the process by which vocational education is delivered has not been a success (Hoachlander, Choy and Lareau, 1985). Funding formulas have powerful effects on the behavior of local administrators. When devising these formulas, it is important to give greater thought to their incentive effects.

The wrong incentives are generated by formulas for state reimbursement of the costs of occupational education that are based upon October enrollments or average daily attendance. The aid received by the district is unrelated to the effectiveness of its programs.[14] Success in recruiting students into the program is rewarded rather than success in serving the student. Since the primary demonstrated benefits of vocational education are economic and derive from using the occupationally specific skills taught in school, it is appropriate for funding formulas to reward programs which do a better job of raising earnings of their graduates, of placing them in jobs or further schooling related to their training, and of developing workers who are praised and appreciated by their employers.[15] Since dropout prevention is another important benefit of vocational education, it is also appropriate for the formula to reward programs which lower the dropout rates of high risk students most dramatically.

State reimbursement formula should be based on outcomes not inputs, and on students not programs. The formula should promote the revamping or discontinuation of programs that do not place a respectable number of graduates in jobs or further education related to the training, raise the earnings of program graduates above those of comparable nonvocational students, or achieve some mix of well-defined economic and educational goals.[16]

One of the concerns that has been expressed about performance standards is that it may encourage creaming. This can be avoided, however, by devising a formula that offers larger rewards for success in serving more challenging students: the learning disabled and those at high risk of dropping out. Since teachers quite naturally prefer to teach intelligent, well-behaved, motivated students, there will always be pressure to cream.[17] Only powerful counter-incentives can overcome the natural tendency to cream. State funding formulas can be such a counter-incentive if they offer larger reimbursements for success with more challenging students -- the handicapped and those with poor grades in previous grades. If, for example, local districts received $3000 for graduating and placing students scoring in the bottom quartile on standardized tests taken in ninth grade, but only $1000 for graduating and placing students scoring in the top half of the test, a very powerful

incentive would exist to seek out and serve the students for whom success is not assured.

The second feature of the proposed performance standards that would counteract existing incentives to cream is reimbursement based neither on the rate of training related placement nor on the average earnings gains, but rather on the number of training related placements or the average earnings gain times the number graduated. Teachers and counselors would thus face incentives to recruit/admit into vocational education all students who they feel they can help.

When outcomes like training related placements are part of the formula, adjustments would also need to be made for the intensity of demand in the local labor market. Since placements are more difficult to arrange when local unemployment rates are high, dollar reimbursements per placement should be higher when local unemployment rates are high. An illustrative formula that does this is given below:

$$R_i = \$1000 + \$1000(LOWFINC_i) - \$250(JHSGPA_i) - \$250(TEST_i) + \$100(UNRT-6)$$

where R_i = state reimbursement for the education of the "i"th student, $LOWFINC_i$ is a 0-1 dummy indicating the "i"th student is Title 1 eligible, $JHSGPA_i$ is the "i"th students junior high GPA Z score (measured in standard deviations from the mean), $TEST_i$ is the Z score on a comprehensive test of aptitude or achievement given in 9th grade and UNRT is the local unemployment rate.[18] Formulas should also be adjusted for fields of study to reflect differences in goals, costs of instruction, and market conditions (e.g., expected rates of training related placement might be higher for distributive education and for office education).

One potential objection to suggestions that funding allocations be based on success in training related placement is that the figures currently reported to state departments of vocational education are not comparable across districts and programs, are subject to manipulation, and suffer from a nonresponse problem. However, there is no reason why a more reliable reporting system cannot be developed. Most states have a computerized wage reporting system for the 99 percent of all wage and salary workers that are covered by unemployment insurance. Estimates of the earnings impact of vocational rather than a general education can be obtained rather easily by

merging wage record data into school files on curriculum and the test scores of students. Since the information system contains the name, address and industry of the student's employer, it can also be the starting point of a follow up system providing a valid count of graduates who have training related jobs.[19]

Summary

Students leaving school today to look for jobs face serious problems. When an employer is considering a group of applicants, a recent school leaver is at a disadvantage. The employer generally knows little about new entrants to the labor market and will probably pass over them in favor of more experienced candidates. To get a good job, the young person must be noticed; he or she must stand out in a crowd of applicants. Schools can help students overcome such problems by taking these steps:

- Help students see the value of acquiring a strong foundation of basic and occupational skills
  - --Emphasize the connections between school performance and job success.
  - --Improve communication with employers to maximize performance rewards.
  - --Motivate students through a strong school reward structure.
  - --Establish a Competency Profile system that recognizes the student's growing competence and signals his/her accomplishments to parents and employers.
  - --Expand Cooperative Education

- Teach students how to market themselves and aid them in the marketing effort.
  - --Teach students the value of personal contacts.
  - --Encourage school personnel to act as informal contacts.
  - --Reward teachers who place their students in training related jobs.

- Help employers get information about students.
  - --Teach students to evaluate employers and job offers accurately.
  - --Teach students the value of giving employers information.
  - --Encourage students to create and use a job search portfolio.
  - --Make it as easy as possible for employers to get student transcripts.

Employers can help by taking the following steps:

- Recruit cooperative education students for part-time jobs and invest heavily in training them.

- Ask school personnel to recommend graduating students for jobs at their firms.

- Give greater emphasis to school grades and performance on achievement tests (such as the New York State Regents Exams) when making hiring selections, and publicize this emphasis to the community.

- Work cooperatively with schools to ensure that transcripts are sent rapidly when student permission has been obtained and to establish a more complete standardized reporting framework like a job search portfolio.

- Volunteer to speak in schools about the competencies required for getting a job and for being successful at work.

- Volunteer to become a mentor for small groups of students.

FOOTNOTES

1. All published estimates of the impacts of vocational education on dropout rates and labor market success are potentially subject to selection bias. Even though these estimates are made while controlling for all measurable background characteristics, it is possible that there is some unmeasured personality trait that (a) existed prior to entry into vocational education (b) is stable and (c) has important effects on both the outcomes studied and the probability of participation in vocational education. Selection bias probably exaggerates the effect of participation in vocational education on the labor force participation of women and may produce downward biases in estimates of its effect on wage rates. A second source of bias is inaccuracies in the measurement of participation in vocational education. Such errors in measurement cause downward biases in estimates of the effect of participation in vocational education. Estimates of the impacts of vocational education would be more reliable if they were based on an experimental design, but no such experiments have been conducted. Consequently, policy decisions must be based on the high quality nonexperimental longitudinal studies that are available. This review has made extensive use only of studies that the reviewer judges to be "high quality." Nevertheless, the impact of selection bias on these findings can only be guessed.

2. These estimates of the effects of vocational education were derived from Table 14 and 16 of Campbell et al (1986) by calculating a weighted average of the six coefficients on concentrator, limited concentrator and concentrator/explorer with and without a training related job and then subtracting the coefficient on academic program (transcript defined). The regressions included controls for the following: sex, minority status, handicapped, limited English proficient, test scores, grade point average, family background, attitudes, past and present college attendance, employment during high school, aspirations in 8th grade, region, rural/urban. The estimates for 1985 are taken from Table 7 of Campbell et al., 1988. The analysis of HSB data contained additional controls for presence of a spouse or child, absenteeism and discipline problems in high school. The monthly earnings models controlled for labor market experience and tenure on ones current job. The HSB model of monthly earnings also contained controls for occupation.

3. The occupation of the current or most recent job is matched against field of training to define training relatedness. One has to be in the labor force at least one week during the year to be in a training related job, so the association between the two reflects both directions of causation. Since almost all individuals in the sample had been in at least one job since completing school, this is not likely to be a serious source of bias.

4. The analysis makes use of data on 550 pairs of recently hired workers employed in the same or a very similar job at 550 different firms. The following model was estimated:

$$Y_1 - Y_2 = A\,(D_1 - D_2) + B\,(X_1 - X_2)$$

where Y_1-Y_2 = is the difference between the productivity or required training of person 1 and person 2

D_1, D_2 = A dummy indicating that person 1 or 2 had obtained vocational training from a school that was relevant to the job for which he/she was hired

X_1, X_2 = A vector of control variables for the circumstances of the hire, and the new hires other credentials. When current productivity is Y, tenure squared are included in the X's.

5. When a less rigorous definition of training relatedness is used (e.g. one based on questions like "On your present job, how much do you use the vocational training you received in high school or area vocational center?" Bice and Brown, 1973), more than half of vocational graduates report using their training. This implies that a substantial minority of vocational graduates report making some use of their vocational education even though there is no match between their occupation and their training. The Campbell et al., (1986) study implies that the amount of carryover is probably quite small, for these graduates were treated as having an unrelated job and the overall wage impact of vocational education for those with an unrelated job was close to zero.

6. The U.S. rate of training related placement might have been somewhat higher if measured 6 months after high school graduation. However the German definitions of relatedness are more rigorous and applying them to U.S. data would have lowered training related placement rates. High unemployment rates no doubt contribute to the low rates of training related placement in the U.S. However, aggregate differential between the countries in training related placement cannot be attributed to differentials in the general tightness of labor markets.

7. If asked by someone other than the employer, some school officials might have defended their policy on the grounds that poor students will not be considered if an employer learns of this fact. What they don't realize is that the policy results in no recent graduates (whether good or poor student) getting a job that pays well and offers opportunities for training and promotions. In effect they are saying the interests of the students who do not study and are discipline problems should take precedence over the interests of the students who lived by the schools rules and studied hard. There is nothing unfair about letting high school GPA's influence the allocation of young people to the best jobs. The GPA's are an average which reflects performance on 100's of tests, and the evaluations of over 20 teachers each of which is based on over 180 days of interaction. Selection decisions must be made somehow. If measures of performance in school are not available, the hiring selection will be determined by the chemistry of a job interview and idiosyncratic recommendations of a single previous employer. Since many employers will not request the information, providing information on student performance does not prevent the poorer student from getting a job; it only influences the quality of the job that the student is able to get.

8. These courses were selected from a more complete list of courses to represent math and science course work generally taken during or after the sophomore year in high school. The specific model estimated was:

$$Y_{i,t} - Y_{i,t-1} = BX_{i,t-1} + \phi C + O\Psi_{j=1,i-1,t-1} \qquad i = 1....11$$

where

$Y_{i,t}$ = the "i"th outcome variable measured at the end of senior year. (e.g. math test score)

$Y_{i,t-1}$ = the sophomore year measure of the "i"th outcome variable

$Y_{j=i,i-1,t-1}$ = a vector of sophomore year measures of outcome variables other than the "i"th

$X_{i,t-1}$ = a vector of variables characterizing background and curriculum course-work variables measured in the sophomore year

C = a vector of variables describing the courses taken in junior and senior year

ϕ = a vector of coefficients measuring the impact of course work on learning and career aspirations

9. Estimates of impact in terms of grade equivalents were made making the conservative assumption that at the 12th grade one standard deviation on the HSB tests was equivalent to 3 grade equivalents.

10. This statement is subject to the following caveat. There are many differences across individuals and vocational programs in the marginal payoff to vocational course work that could not be incorporated in the models estimated in this paper. If such differences are visible to individual students and teachers and they have confidence in their local information, they should base decisions on the local information even though it may contradict one of the generalizations just made.

11. These results come from estimating the regression models described in footnote 8.

12. Students who have not signed a contract and who do not have career plans in the field might be allowed to take vocational courses along side of the "contract" students but state reimbursements would not be available for such students.

13. Exceptions would probably have to be made for handicapped students, rural communities with no jobs in the field of training and for programs that feed their graduates into training programs at a postsecondary institution. (For a fuller description of the rationale of coop education see Ruff et al. 1982; Lewis and Fraser 1982; and Barton 1981).

14. If students are able to evaluate program quality and avoid programs judged of low quality, enrollment based funding will reward quality. Students, however, are not well informed about program quality, they may not care about quality and their commitment to a particular occupation may be so strong they will stick with it even if the teacher is doing a poor job. An additional problem is that student enrollment choices may be manipulated by teachers with quotas to fill. Especially perverse incentives arise when occupational programs must have some minimum enrollment to receive state funds. Teachers in need of bodies to meet the target are often willing to accept and sometimes actively recruit into their program students who they know do not want or have only a low probability of getting a job in the field.

15. The use of training related placement rates in reimbursement formulas is clearly feasible for it has been implemented in two states, Florida and South Carolina. JTPA's performance standards also have many similarities to what is being proposed here. Tennessee funds it's state colleges and universities in part through a performance incentive system (Bogue & Brown, 1982).

16. The outcomes included in the formula would not have to be limited to economic outcomes. Other indicators might also be employed such as: checklists of competencies attained, numbers of participants in skill olympics and the average rating of the submissions, completions of more advanced training by program graduates, evaluations by the teachers in these postsecondary programs, and scores on occupational competency exams or state licensing exams.

17. Reputations of teachers and programs are influenced by absolute levels of student performance -- contests won, houses well constructed, and good jobs obtained. Value added -- saving students who were headed for failure -- is much harder to assess. Attention goes to the students who fail rather than the ones who graduate and find a job despite handicaps or a disadvantaged background. Not surprisingly teachers compete for the opportunity to teach the better students. All of these factors create incentives to cream -- that is to recruit the most able and screen out those with learning problems or a bad attitude.

18. The selection of specific parameters for such a formula is a political decision because distributional considerations must be balanced against incentive effects. Each criterion used would need its own set of adjustment factors. Studies of the background and environmental determinants of each potential criterion would be helpful in making these decisions but are not necessary. Performance based funding formulas are feasible for general education as well.

19. In many cases the match between the industry and the field of training will be so close that a training related placement can be assumed without the necessity of a follow up. Where the nature of the job is not clear from the industry code, a card could be sent to the employer requesting a description of the employee's job and possibly also asking for an evaluation of the training the employee had received. If no response is

received from the card, an independent survey firm could be contracted to telephone the employer. Where no match turned up in the system, an effort could be made to call the student's parents. The list of students and their job classifications would be sent to the vocational teacher and the school district. This would give the teacher the opportunity to appeal and correct mis-classifications.

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